What is claimed is:

1. A method of forming an image of a subject, the method comprising:

(a) scanning the subject in a first direction to take image data of a first plurality of slices;

(b) scanning the subject in a second direction which is different from the first direction to take image data of a second plurality of slices;

(c) registering the first plurality of slices with the second plurality of slices; and

(d) fusing the first plurality of slices with the second plurality of slices to form the image.

2. The method of claim 1, wherein the second direction is orthogonal to the first direction.

3. The method of claim 1, wherein steps (a) and (b) are performed with magnetic resonance imaging.

4. The method of claim 1, wherein step (c) comprises maximizing a correlation based on the image data of the first and second pluralities of slices.

5. The method of claim 4, wherein the correlation is a correlation of gradients of the image data of the first and second pluralities of slices.

6. The method of claim 5, wherein the correlation is maximized through a hill-climbing technique.

7. The method of claim 6, wherein the hill-climbing technique is a multiresolution hill-climbing technique.

8. The method of claim 7, wherein:

steps (a) and (b) are performed with a device having an in-plane resolution; and

the multiresolution hill-climbing technique is performed with a plurality of resolutions including:

(i) a maximum resolution which is twice the in-plane resolution; and

(ii) a minimum resolution which is one-quarter of the in-plane resolution.

9. The method of claim 6, wherein the hill-climbing technique is used to determine both a relative displacement and a relative rotation between the first and second pluralities of slices.

10. The method of claim 5, wherein the correlation is a correlation of a subsample of the image data of the first plurality of slices with a subsample of the image data of the second plurality of slices, the subsamples being taken in accordance with gradients of the image data.

11. The method of claim 1, wherein:

the image data of the first plurality of slices have a low resolution in the first direction and a high resolution in directions orthogonal to the first direction;

the image data of the second plurality of slices have the low resolution in the second direction and the high resolution in directions orthogonal to the second direction; and

step (d) comprises fusing the first plurality of slices with the second plurality of slices such that the image has the high resolution in all directions.

12. The method of claim 11, wherein step (d) comprises treating the image as a linear combination of functions having the low resolution and deriving the functions from the image data of the first and second pluralities of slices.

13. The method of claim 12, wherein the functions are derived through an iterative process using the image data of the first and second pluralities of slices as initial assumptions for the functions.

14. The method of claim 1, wherein steps (a) and (b) are performed using MRI with a plurality of receiving coils.

15. The method of claim 14, wherein steps (a) and (b) are performed using at least three receiving coils.

16. The method of claim 15, wherein steps (a) and (b) are performed using at least four receiving coils.

17. The method of claim 1, wherein:

steps (a) and (b) are performed through MRI; and

the image data of the first plurality of slices and the image data of the second plurality of slices comprise image data having a plurality of spectral bands.

18. The method of claim 17, wherein step (d) comprises selecting a subplurality of the plurality of spectral bands to form the image.

19. The method of claim 18, wherein the subplurality of the plurality of spectral bands is selected by ranking the plurality of spectral bands in order of image contrast and selecting the spectral bands whose image contrast is highest.

20. The method of claim 19, wherein the plurality of spectral bands is ranked in order of image contrast by:

deriving a covariance matrix from the plurality of spectral bands;

deriving a set of orthogonal eigenvectors and a corresponding set of eigenvalues from the covariance matrix; and

ranking the orthogonal eigenvectors in order of their corresponding eigenvalues.

21. A method of forming an image of a subject, the method comprising:

(a) performing an MRI scan on the subject to take image data having a plurality of spectral bands; and

(b) forming the image from the image data.

22. The method of claim 21, wherein step (b) comprises selecting a subplurality of the plurality of spectral bands to form the image.

23. The method of claim 22, wherein the subplurality of the plurality of spectral bands is selected by ranking the plurality of spectral bands in order of image contrast and selecting the spectral bands whose image contrast is highest.

24. The method of claim 23, wherein the plurality of spectral bands is ranked in order of image contrast by:

deriving a covariance matrix from the plurality of spectral bands;

deriving a set of orthogonal eigenvectors and a corresponding set of eigenvalues from the covariance matrix; and

ranking the orthogonal eigenvectors in order of their corresponding eigenvalues.

25. The method of claim 21, wherein step (a) is performed with a plurality of receiving coils.

26. The method of claim 25, wherein step (a) is performed using at least three receiving coils.

27. The method of claim 26, wherein step (a) is performed using at least four receiving coils.

28. A system for forming an image of a subject, the system comprising:

scanning means for (i) scanning the subject in a first direction to take image data of a first plurality of slices and (ii) scanning the subject in a second direction which is different from the first direction to take image data of a second plurality of slices; and

computing means for (i) registering the first plurality of slices with the second plurality of slices and (ii) fusing the first plurality of slices with the second plurality of slices to form the image.

29. The system of claim 28, wherein the second direction is orthogonal to the first direction.

30. The system of claim 28, wherein the scanning means comprises an MRI scanner.

31. The system of claim 28, wherein the computing means registers the first and second pluralities of slices by maximizing a correlation based on the image data of the first and second

pluralities of slices.

32. The system of claim 31, wherein the correlation is a correlation of gradients of the image data of the first and second pluralities of slices.

33. The system of claim 32, wherein the correlation is maximized through a hill-climbing technique.

34. The system of claim 33, wherein the hill-climbing technique is a multiresolution hill-climbing technique.

35. The system of claim 34, wherein:

the scanning means has an in-plane resolution; and

the multiresolution hill-climbing technique is performed with a plurality of resolutions including:

(i) a maximum resolution which is twice the in-plane resolution; and

(ii) a minimum resolution which is one-quarter of the in-plane resolution.

36. The system of claim 35, wherein the hill-climbing technique is used to determine both a relative displacement and a relative rotation between the first and second pluralities of slices.

37. The system of claim 32, wherein the correlation is a correlation of a subsample of the image data of the first plurality of slices with a subsample of the image data of the second plurality of slices, the subsamples being taken in accordance with gradients of the image data.

38. The system of claim 28, wherein:

the image data of the first plurality of slices have a low resolution in the first direction and a high resolution in directions orthogonal to the first direction;

the image data of the second plurality of slices have the low resolution in the second direction and the high resolution in directions orthogonal to the second direction; and

the computing means fuses the first plurality of slices with the second plurality of slices

such that the image has the high resolution in all directions.

39. The system of claim 38, wherein the computing means treats the image as a linear combination of functions having the low resolution and deriving the functions from the image data of the first and second pluralities of slices.

40. The system of claim 39, wherein the functions are derived through an iterative process using the image data of the first and second pluralities of slices as initial assumptions for the functions.

41. The system of claim 28, wherein the scanning means comprises an MRI scanner with a plurality of receiving coils.

42. The system of claim 41, wherein the plurality of receiving coils comprises at least three receiving coils.

43. The system of claim 42, wherein the plurality of receiving coils comprises at least four receiving coils.

44. The system of claim 28, wherein:

the scanning means comprises an MRI scanner; and

the image data of the first plurality of slices and the image data of the second plurality of slices comprise image data having a plurality of spectral bands.

45. The system of claim 41, wherein the computing means selects a subplurality of the plurality of spectral bands to form the image.

46. The system of claim 45, wherein the subplurality of the plurality of spectral bands is selected by ranking the plurality of spectral bands in order of image contrast and selecting the spectral bands whose image contrast is highest.

47. The system of claim 46, wherein the plurality of spectral bands is ranked in order of image contrast by:

deriving a covariance matrix from the plurality of spectral bands;

deriving a set of orthogonal eigenvectors and a corresponding set of eigenvalues from the covariance matrix; and

ranking the orthogonal eigenvectors in order of their corresponding eigenvalues.

48. A system for forming an image of a subject, the system comprising:

scanning means for performing an MRI scan on the subject to take image data having a plurality of spectral bands; and

computing means for forming the image from the image data.

49. The system of claim 48, wherein the computing means selects a subplurality of the plurality of spectral bands to form the image.

50. The system of claim 49, wherein the subplurality of the plurality of spectral bands is selected by ranking the plurality of spectral bands in order of image contrast and selecting the spectral bands whose image contrast is highest.

51. The system of claim 50, wherein the plurality of spectral bands is ranked in order of image contrast by:

deriving a covariance matrix from the plurality of spectral bands;

deriving a set of orthogonal eigenvectors and a corresponding set of eigenvalues from the covariance matrix; and

ranking the orthogonal eigenvectors in order of their corresponding eigenvalues.

52. The system of claim 48, wherein the scanning means comprises a plurality of receiving coils.

53. The system of claim 52, wherein the plurality of receiving coils comprises at least three receiving coils.

54. The system of claim 53, wherein the plurality of receiving coils comprises at least four receiving coils.